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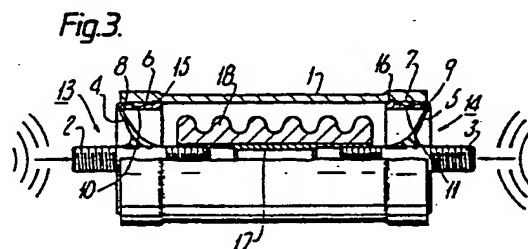
71 Applicant: Sunne Gummifabrik Aktiebolag
 Box 116
 S-686 00 Sunne(SE)

72 Inventor: Häggman, Hardy
 Frödingsvägen 10
 S-686 00 Sunne(SE)

74 Representative: Hynell, Magnus
 I o M Hynell Patent-Tjänst Box 236
 S-683 02 Hagfors(SE)

54 Arrangement for damping the transmission of vibrations.

57 The invention relates to an arrangement for damping the transmission of vibrations between a vibration-producing first object, for example a vibrating machine, working equipment or tool, and a second object, for example a handle which is to be gripped by an operator, a frame, foundation or the like. The arrangement includes a resilient element (4, 7, 11) of polymer material. In accordance with the invention the said element is restrained under a certain prestress between the said first (2, 3, 6) and second (1) object. Furthermore the prestressing force is preferably so chosen that the extension caused by the prestressing force is greater than the amplitude of the vibrational oscillations.



case of conventionally designed dampers, is that rubber and other resilient polymer materials are only slightly compressible. In connection with damping some degree of compression is taken as a basis and thus in the initial position the damper is made to function with a certain loading, i.e. so that the damping element is compressed. When the damper is subjected to vibrations, it thus operates mainly within the compressible range where the counter-forces because of the incompressibility of the material increase logarithmically with the depression.

Although rubber and certain other polymer materials are only negligibly compressible, they are however extremely extensible. This has been utilised in those dampers where one object is resiliently suspended in the other. Such an element presupposes however that one is working under specific conditions. For example such a construction cannot be employed if the arrangements are to adopt different positions in space.

DESCRIPTION OF THE INVENTION

One main object of the invention is to eliminate the limitations of the polymer, resilient material, a priori that of rubber, as regards compression and instead to utilise its great extensibility so that excellent possibilities are obtained for damping the transmission of vibrations, i.e. as regards vibrations to insulate a vibrations-producing object within the entire frequency range from about 8 Hz and above.

One objective of the invention is preferentially also to provide an arrangement which can function in different positions in space.

These and other objectives can be achieved when the resilient polymer element which is arranged between or designed to be arranged between the said first and second objects is pre-tensioned by a certain tensile prestress. More particularly, the prestressing force is at least so great that the extension which this causes is greater than the amplitude of the vibration oscillations caused by the said first

the second object. In this case the resilient element can include a prestressed membrane. It can also have the geometric form of for example spokes in a wheel.

5 As mentioned in the preamble the second object can have a number of differing shapes. One typical sphere of application for the invention is however handles on vibrating tools, working machines and the like. In this case the second object can be described in such a way that it includes a tube or tubular channel. In accordance with a preferred
10 embodiment of the invention two of the resilient elements are arranged in this tube or tubular channel at some distance from each other or beyond both ends of the tube or tubular channel. This signifies that the first object is connected to the handle via the two resilient elements inside the tube or in the area inside or outside
15 both ends of the handle. Here it is appropriate to provide a limiting organ or buffer inside the tube or channel so as to restrict the movements of the second object, i.e. the handle, in the radial direction towards the first object. The need for such a restriction device or buffer can be particularly pressing if the handle is also to be used
20 to raise a heavy machine or the like. This restricting device or buffer here at the same time provides the extreme limits for the "normal sphere of working" of the resilient element, which are referred to above.

25 It should also be obvious that the application of the invention is not restricted merely to such membrane-shaped elements as illustrated in the example. Even elements which are prestressed in for example only two main directions can thus also be employed in certain applications.

30 Further aims of and characteristics of the invention will be illustrated by the following description of preferred embodiments and by the following patent claims.

35 BRIEF DESCRIPTION OF DRAWINGS

In the following description of preferred embodiments reference will be made to the appended drawings in which:

a machine. The components 2 and 3 here comprise what has been designated in the preamble as the vibration-producing first object, whilst the handle 1 forms the said second object. The vibration rods 2 and 3 are each joined to their rubber membrane 4 and 5 respectively. In accordance with the embodiment the rods 2 and 3 are joined with the respective membranes 4 and 5 by vulcanising. The membranes 4 and 5 are considerably extended in the radial plane and their bent over edges 6 and 7 are threaded over a ring 8 and 9 respectively so that the portions of the membrane between the rods 2 and 3 and rings 8 and 9 respectively are greatly extended. The edge portions 6 and 7 are joined with the outsides of rings 8 and 9 by locking using an outer clamping ring which is not shown. To further improve adhesion the rings are provided with a groove 10 and 11 respectively.

15 The resilient elements 13 and 14 respectively thus described are assembled in both ends of the tubular handle 1. For this purpose the rings 8 and 9 are provided with a snap flange 15 and 16 respectively which engages in corresponding grooves on the inside of the tube 1.

20 The two rods 2 and 3 are also joined to each other by a tube 17 inside the handle tube 1. The rods 2 and 3 which are threaded at both ends are screwed into the tube 17 which for this purpose is provided with internal threads. By screwing the rods 2 and 3 in this manner into the tube 17 the membranes 4 and 5 are stretched further, and simultaneously as a result of this extension they adopt the shape of cones facing the interior of the handle. The total extension, i.e. the total initial (radial) elongation of membranes 4 and 5 and the elongation obtained by screwing the rods 2 and 3 into the tube 17 is by this means so great that it exceeds the amplitude of the vibrations, regardless of the direction of oscillation. Thus using the arrangement shown in Fig. 3 extremely good vibration damping properties are achieved both in the radial and axial planes. The thickness of the membranes 4 and 5 in the space between rods 2 and 3 and the rings 8 and 9 is between 5 and 1 mm in accordance with the embodiment.

35 The handle 1 illustrated in Fig. 3 is also to be capable of use for

been turned over a ring 10a. To ensure fixing of the edge portion 6a over the ring 10a there is an outer ring 22 which was also mentioned in conjunction with Fig. 3, so that the rubber edge portion 6a is clamped firmly between the inner ring 10a and the outer ring 22. The latter can also act as flange for snap-action in the same way as the components 15, 15' in the preceding embodiments. Hence the arrangement illustrated in Fig. 6 can comprise a ready-made element which can be employed for a number of different applications. The element should preferably be made in different sizes and with varying appearance so that it can fit in the majority of cases without needing to be modified. To increase the prestressing naturally this element can also be stretched further by axially extending it in the same way as shown in connection with Fig. 3, 4 and 5.

t e r i s e d in that the resilient element includes a resilient, prestressed membrane (4, 7).

5 8. Arrangement in accordance with any of claims 1-7, c h a r a c -
t e r i s e d in that the resilient element includes prestressed
devices which have the geometric shape of spokes in a wheel.

10 9. Arrangement as in any of claims 1-8, c h a r a c t e r i s e d
in that the second object includes a tube or a tubular channel, that
two of the said resilient elements are arranged in the said tube or
tubular channel at a distance from each other or beyond both ends
of the tube or the channel.

15 10. Arrangement as in claim 9, c h a r a c t e r i s e d in that
the restricting device or buffer (18) is arranged inside the tube
or channel which restricts the movements of the second object in the
radial direction towards the said first object.

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Fig. 3.

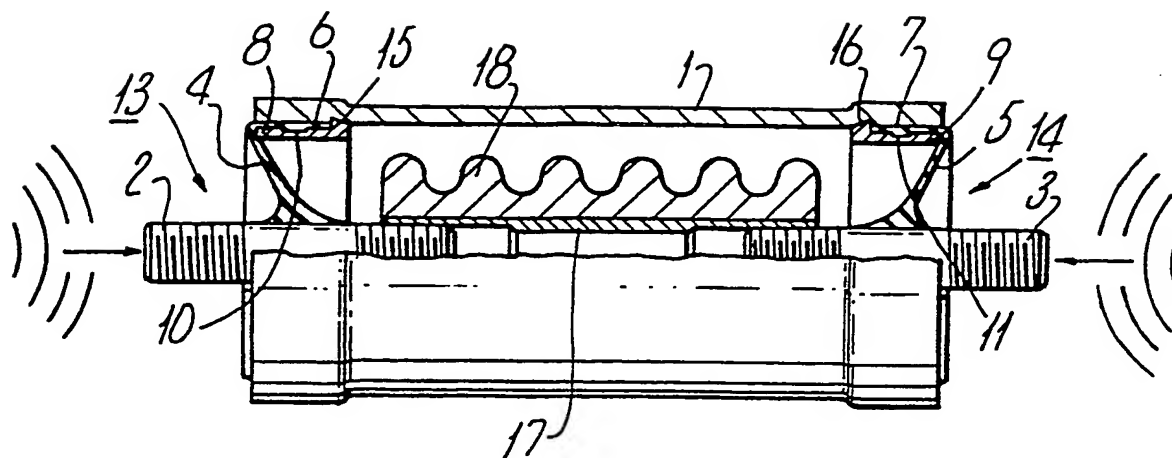


Fig. 5.

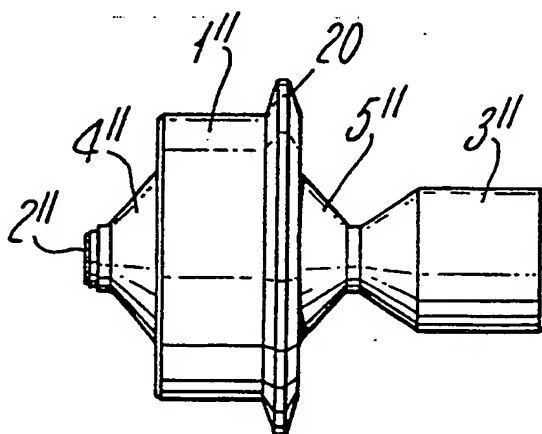
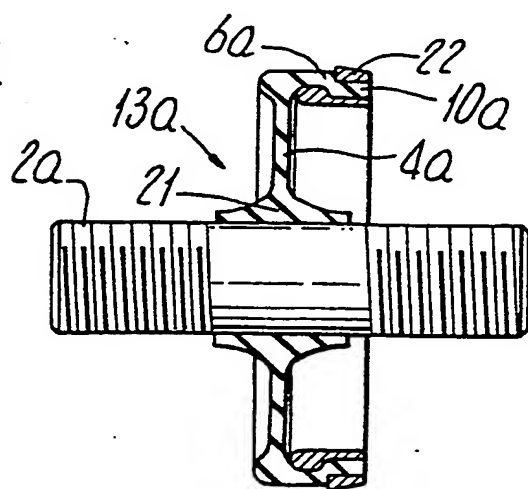


Fig. 6.





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Applicant: Sunne Gummifabrik Aktiebolag, Box 116,
S-686 00 Sunne (SE)

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Inventor: Häggman, Hardy, Frödingsvägen 10,
S-686 00 Sunne (SE)

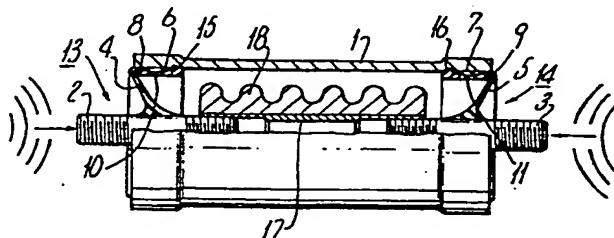
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Representative: Hynell, Magnus, I o M Hynell
Patent-Tjänst Box 236, S-683 02 Hagfors (SE)

Arrangement for damping the transmission of vibrations.

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EP 0 081 079 A3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	FR-A-2 079 487 (PINEAU)		
A	FR-A-1 099 602 (PRODUCTIONS VANO)		
A	DE-A-2 603 995 (VW)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-06-1983	Examiner ESPEEL R.P.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application. L : document cited for other reasons & : member of the same patent family, corresponding document	